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ADOPTION OF IMPROVED SEEDS OF MILLET AND COWPEA BY FARMERS IN MADAROUNFA DISTRICT, NIGER REPUBLIC

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ABSTRACT
The issue of low agricultural output has continued to be a concern to Niger Republic. The rapidly growing population of the country requires more food. Up till now however, agricultural supplies have not matched up with demands in the country. Related to this problem is the low pace in the adoption and use of agricultural technologies. This study examined the extent of adoption of improved seeds developed by the National Institute of Agricultural Research (INRAN) by farmers in Madarounfa district. Data were collected from 120 farmers randomly selected from 12 villages of the district of Madarounfa. The data were analyzed using simple descriptive statistics and regression analysis. Findings from the study revealed that 59% of respondents fell within the range of 20 to 49 years, 56% are educated, and the average farming experience is 39 years. The study also revealed that the average farm size cultivated is 3 ha, while 90% of land are inherited and donated in the study area. The results further showed that the rate of adoption for improved seeds of millet and cowpea were 48% and 47% respectively. Similarly, high cost of improved seeds, high cost and unavailability of fertilizer, and inadequate supply of inputs constituted the major constraints to improved seeds adoption. The results from regression analysis revealed that experience in farming ($P<0.05$) influences significantly the adoption of improved seeds of millet while membership of cooperative ($P<0.05$) influenced significantly the adoption of improved seeds of cowpea. Therefore, to increase the rate of adoption of technologies developed by INRAN, inputs subsidy, improved extension services, institution of agricultural credit policy and adequate funding are recommended.

KEYWORDS: Adoption, Millet, Cowpea, Improved, Madarounfa

INTRODUCTION

Niger republic depends on agriculture for its livelihood (Niger,1991). Improving the welfare of the population thus requires sustainable agricultural development. The overall productivity of agricultural sector has traditionally been low and virtually stagnant. The significant proportion of the farming population depends almost entirely on the use of primitive implements, inadequate seeds, and inadequate cultural practices. Without technical innovation in agriculture it is almost sure that Niger Republic economy will not be able to generate the surplus needed to sustain high rates of economic growth. The need for agricultural and structural transformation of rural sectors enterprises, most specially farm enterprises emphasized the importance of adequate agricultural research. In other words, the rate of agricultural development and rural transformation is directly related to an effective agricultural technologies transfer and the educational standards of the rural communities. The broad objective of the study is to examine the extent of adoption of the agricultural technologies developed by the National Institute of Agricultural Research (INRAN) in the study area.

The specific objectives are:
- To assess the socio - economic characteristics of farmers
- To determine the rate of adoption of improved seeds of millet and cowpea in the study area
- To identify the major constraints to the adoption of improved seeds of millet and cowpea
- To identify the factors affecting the adoption of improved seeds of millet and cowpea.

METHODOLOGY

Data Analysis

The study area is Madarounfa district located in the southern part of Maradi region of Niger Republic. Farming occupies the major occupation of the populace (80%). The major crop produce here includes millet, sorghum, cowpea maize and cassava (Niger,1991). A sample of 120 farmers was drawn from 12 villages using simple random sampling technique. The villages are Garin - Liman, Sabon- Gari El – Mongou, Dagazari, Wajia, Gangare, Dama, Soumarana, Aderawa, Radi Safo, Dan Ali and Maya- Oukou. In each of the villages a total of 10 farmers were selected and interviewed using questionnaires. The data collected were analysed using descriptive statistics and regression analysis.

Descriptive Statistics.

To assess the socio - economic characteristics of farmers, the rate of adoption, the major constraints to agricultural technologies adoption, percentages, means and frequencies were used.

Regression Analysis.

To logit model was used to explore the effects of independent variables including socio - economics characteristics on the dependent variable or the probability of adoption of improved seeds of millet and cowpea. Under this model, the probability of farmers adoption depends on his socio - economics attributes and is defined as:

$$P(Y = 1) = \exp (a + bi\ x_i)/[1 + \exp(a + bi\ x_i)]$$

Where Y is the dependent variable that takes on the value of 1 for adoption, P is the probability of adoption of a given farmer, exp = exponential function, a = constant of the regression, bi = vector of parameters to be estimated on the itch farmer, xi are explanatory variables related to the adoption of the farmer as follows:-

Variables	Definition
Age	Age of farmer.
Exp Farm	Experience in farming (number of years)
H size	Household size (number of persons)
CINRAN	Contact with INRAN (1 = yes; 0 = no)
C extension	Contact with extension (1 = yes; 0 = no)
Education	Level of education (1 = educated; 0 = I illiterate
Farm size	The total surface of the farm (ha)
Memb coop	Membership of cooperative (1 = yes; 0 = no)
Revenue	Other income – generating activities apart from agriculture (1 = yes; 0 = no)

Exp Farm = Farming Experience; CINRAN = Contact with National Institute of Agricultural Research
C extension = Contact with Extension Worker; Memb coop = Membership of Cooperative Society.

RESULTS AND DISCUSSION

Personal characteristics of farmers

Table 1 indicates that 59% of respondents fell within the range of 20 to 49 years, these categories of farmers could be considered to be the economically active population (Oluwasanmi, 1986). These farmers are less cautions of undertaking new risks, thus implore and adopt new method in order to enhance their willing and cages to economic position. The table also shows that 40% of farmers have household size of between 6 and 10 members, while 27% of farmers have household size greater than 10. Thus, overall majority of farmers have adequate family. This situation may favor the adoption of agricultural technologies since higher rural labor supply necessitates greater adoption of labor intensive technology (Hicks Et al., 1974) and shortage of family labor leads to non-adoption (Harwood, 1985). The table further shows that 57% of farmers are educated. The exposure ratio of 57% of farmers to education reveals the potential for increased awareness and adoption of recommended practices among the rural populace, since farmer's adoption is a function level of education (Fedu, 1974). Also, the table indicates that the farmers have an average farming experiences of 39 years. This is significant, even if in Niger Republic the apprenticeship in farming begins at 7 to 10 years. It is good information that the farmers have an adequate knowledge of agricultural activities.

Agricultural Enterprise

Table 2 reveals that the average farm size cultivated in the study area is 3 ha. This situation may bring about the non adoption of agricultural technologies since adoption is a function of availability of appropriate farm size (Sanders, 1995).

Table 2 also reveals that 89% of lands are inherited and donated in the study area. This indicates that more farmers are operating their personal farm lands. This situation should provide sufficient security of tenure to justify measures to maintain or improve the productivity of farms, so to adopt new technologies.

Table 1: Personal characteristics of farmers.

Variables	Frequency	Percentage
Age		
20 - 29	2	1.66
30 - 39	32	26.66
40 - 49	37	30.80
50 - 59	18	15
60 and above	31	25.83
Total	120	100
Mean	48.80	
Household size		
1 - 5	40	33.33
6 - 10	48	40
11 - 15	21	17.5
16 - 20	10	8.33
21 and above	1	0.83
Total	120	100
Mean	8.19	
Educational status		
Primary school	30	25
Secondary school	9	7.5
Quoranic	29	24.16
Illiterates	52	43.33
Total	120	100
Farming experience		
10 - 19	3	2.5
20 - 29	28	23.33
30 - 39	44	36.66
40 - 49	19	15.83
50 - 59	16	13.33
60 and above	10	8.33
Total	120	100
Mean	38.90	

Field survey 2002

Table 2: Distribution of farmers according to farm size and form of possession

Variables	Frequency	Percentage
Farm size (ha):		
0.5 - 1.9	25	20.83
2.0 - 5.0	86	71.66
5.1 -9.0	7	5.83
10 and above	2	1.66
Total	120	100
Mean	3.0	
Form of possession of land:		
Inheritance	113	62.08
Renting	4	2.19
Donation	49	26.92
Purchasing	9	4.94
Others	7	3.84
Total	182	100

Source: Field survey, 2002

Adoption of improved seeds

Table 3 presents the rate of adoption of improved seeds in the study area. It shows that 48% of respondents adopted respectively improved seeds of millet and cowpea in 2002, whereas from 1997 to 2001 the rates of adoption were 69% for millet and 67% for cowpea. The constraints linked to the use of these technologies such as high cost, unavailability and inadequate supply of inputs may explain the decreasing of the rate of adoption in 2002.

Table 3: Adoption of improved seeds

Years	Millet			Cowpea		
1997 to 2001	A	%	N	A	%	N
	83	69.16	120	81	67.5	120
2002	58	48.33	120	56	46.66	120

Source : Field survey, 2002

A= Frequency of adopters, % = Percentage of adoption, N = Sample size

Constraints to the utilization of improved seeds

Table 4 presents the result of the distribution of respondents according to the constraints to improved seeds utilization. It shows that high cost of improved seeds, high cost and unavailability of fertilizer constitute the major constraints to improved seeds utilization. The respondents also reported that the inadequate supply of improved seeds becomes a constraint. This situation point out the necessity to supply timely farmers with appropriate inputs at a reasonable price, otherwise the improved seeds used at present will lose their performance and thus could be exceeded by the local varieties.

Table 4: Distribution of farmers according to the constraints to improved seeds utilization

Constraints	Millet		Cowpea	
	Freq.	%	Freq.	%
Unavailability of fertilizer	13	22.75	13	22.41
Expensive	19	32.75	21	36.20
High cost of fertilizer	14	24.13	12	20.68
Inadequate supply	12	20.68	4	6.89
Lack of chemicals	-	-	6	10.70
Others	-	-	-	-
Total	58		56	100

Sources: Field survey, 2002

Analysis of factors determining adoption of improved seeds of millet

Table 5 reveals that only the factor experience in farming ($P<0.05$) has significant influence on the adoption of improved seeds of millet, otherwise the farmers with long experience in farming are more inclined to adopt improved seeds of millet. The years of experience of farmers in farming to a large extent affects the farmer's managerial ability and decision in many farm operations. Similarly, adoption influences perception and understanding of climatic and factors that affect farming.

Analysis of factors determining adoption of improved seeds of cowpea

Table 6 shows that the factor membership of cooperatives ($P<0.05$) has significant influence on improved seeds of cowpea adoption. Cooperative help farmers to pool resources, to have access to farm inputs and to have insights in there farming issues. Membership of cooperatives is therefore a factor which influences the adoption of improved seeds of cowpea. This confirm the observation of Osuntogun and Adeyene (1984) who stated that cooperatives enables small farmers to pool resources to have access to inputs and to enjoy the economics of large scale farming.

Table 5: Result of the regression analysis of improved seeds of millet adoption by farmers.

Variables	Coefficients	T - statistics
Constant	.156	.521
Age	-.027	-.243
Education	.056	.498
H. Size	-.038	-.310
Exp. Farm	.165	1.885 **
Revenue	.072	.718
Farm size	-.062	-.503
C . INRAN	.098	.976
C . Extension	-.125	-1.270
Member coop	-.002	-.018
R^2	.045	

** Sign at 5%

Table 6: Result of the regression analysis of improved seeds of cowpea adoption by farmers.

Variables	Coefficients	T - statistics
Constant	.691	2.359
Age	-.160	-1.455
Education	.039	.351
H. Size	.024	.201
Exp. Farm	.108	.884
Revenue	-.141	-.1441
Farm size	.048	.399
C . INRAN	-.051	-.515
C . Extension	.039	.399
Member coop	.228	2.275 **
R^2	.082	

** sign at 5%

CONCLUSION

This study shows that in terms of yield, the impact remains below expectation. This situation may be explained by the fact that the technologies develop by INRAN draw their inspirations from model of intensive agriculture that require the use of expensive inputs. The adoption level could be increased if the constraints identified in the study are addressed. Institution of input subsidy policy may enable the farmers to increase the level of adoption for the technologies.

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